

The Nexus between Monetary Policy Transmission Mechanisms and Economic Development in Sierra Leone for the Period (1993 – 2023)

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Abstract:- This research investigated the transmission mechanisms of monetary policy and their impact on economic development in Sierra Leone from 1993 to 2023, aiming to evaluate their effectiveness in achieving key macroeconomic goals such as employment generation, balance of payments stability, and maintaining a relatively stable general price level. The study sought to understand how these transmission mechanisms influence economic development in Sierra Leone, particularly at a time when the country is grappling with significant macroeconomic challenges, including high unemployment, price volatility, and elevated inflation rates. Data spanning from 1993 to 2023 were collected from the World Bank Economic Indicators and Bank of Sierra Leone Statistical Bulletin through a purposive sampling approach. The research employed a blend of ex-post facto, longitudinal, descriptive, causal-effect, and correlation research designs. The statistical analyses conducted included the Augmented Dickey Fuller (ADF) unit root test, Granger causality test, ordinary least squares multivariate regression, generalized method of moments, Johansen co-integration, and vector error correction mechanisms. The findings revealed that capital stock (coefficient of 0.13), money supply (0.17), migrant remittances (6.5), and exchange rate (0.08) exhibited significant and positive long-term relationships with Sierra Leone economic development during the observed period. Conversely, the monetary policy rate (0.10) and credit to the private sector (0.30) demonstrated positive yet insignificant effects on economic development. Interest rates (-0.71) were found to have a significant negative relationship, while the inflation rate (-0.03) was negatively related but not significant. The study concludes that monetary policy transmission mechanisms have both short-term and long-term relationships with economic development in Sierra Leone, underscoring the importance of their effective implementation. Monetary policy transmission mechanisms have proven to be effective instruments for fostering economic development in Sierra Leone. It is advisable for both the Ministry of Finance and Bank of Sierra Leone, as the regulatory authorities, to consistently ensure an optimal combination of monetary policy tools. This approach is essential for significantly impacting economic activities, encouraging investments, and ultimately enhancing macroeconomic stability in the country. Furthermore, these regulatory bodies should regularly evaluate the monetary policy rate and the credit available to investors to create a favorable

investment and business environment in Sierra Leone. Additionally, effective policies should be implemented to increase remittance inflows into Sierra Leone, directing investments towards productive uses rather than consumption, which may lead to inflationary pressures. The insights gained from this study contribute to the existing literature on economic development and the mechanisms of monetary policy transmission. The dynamic estimation technique, akin to the Generalized Method of Moments, effectively assessed the endogeneity between monetary policy variables and economic development in Sierra Leone.

Keywords:- Gross Domestic Product per Capita, Interest rate, Monetary Policy, Monetary Policy Rate.

I. INTRODUCTION

The Monetary Policy Transmission Mechanism refers to the process through which monetary policy decisions influence asset prices and overall economic conditions. These decisions aim to impact aggregate demand, interest rates, and the supply of money and credit, thereby affecting the broader economic performance. Monetary policy serves as a crucial tool for economic stabilization, involving strategies designed to manage the volume, cost, availability, and direction of money and credit within an economy to achieve specific macroeconomic objectives. The responsibility for implementing monetary policy lies with the Central Bank, which seeks to fulfill these objectives. Central Banks globally, including the Central Bank of Sierra Leone (BSL), typically utilize various monetary policy instruments such as the bank rate, open market operations, adjustments to reserve requirements, and other selective credit control measures.

The Central Bank establishes specific targets related to monetary variables. While some of these objectives align with one another, others may not. For instance, the goal of maintaining price stability can often be at odds with the aims of ensuring interest rate stability and achieving high or short-term employment levels.

Mishkin (2007) notes that monetary policy impacts the economy through various channels, including interest rates, credit availability, bank lending, and asset prices influenced by exchange rates, equity, and housing markets. Research into the effects of monetary policy on the economy remains a vibrant area of study, as the mechanisms through which

economic shocks are transmitted evolve with changes in both global and domestic contexts. Recently, there has been a growing focus on the sectoral impacts of monetary policy, recognizing that different sectors respond variably to monetary policy shocks. This understanding is crucial for macroeconomic management, as monetary authorities must consider the diverse effects of their decisions across various economic sectors. For example, while a general tightening of monetary policy may be justified, it could disproportionately affect certain sectors. If this is the case, monetary policy may indeed exert significant distributional effects within the economy.

Alam and Waheed (2006) argue that identifying sectors adversely impacted by monetary tightening can provide essential insights for monetary authorities, aiding in the comprehension of the transmission mechanisms of monetary policy actions.

There is a lack of agreement among economists regarding the effectiveness of government intervention via monetary policy in achieving economic stabilization. This divergence has led to the emergence of various schools of thought, including the classical, Keynesian, and monetarist schools, each offering distinct perspectives on how changes in monetary aggregates may influence economic stability and growth. The mechanisms through which monetary policy impacts an economy typically involve the monetary policy rate, money supply, exchange rates, and credit availability to the private sector, among other factors. The influence of these transmission mechanisms on economic growth and development remains uncertain. In light of this, the present study aims to explore the relationship between monetary policy transmission mechanisms and economic development in Sierra Leone.

The primary objectives of monetary policy include controlling inflation and managing exchange rates, which have been central to Sierra Leone monetary policy efforts over time. In developed nations such as the United States and several key European countries, there is considerable evidence supporting the effectiveness of monetary policy innovations on real economic activities (Mishkin, 2002; Ratiq & Mallick, 2008). Conversely, in developing nations like Sierra Leone, the empirical relationship between monetary policy and economic performance remains unclear. Numerous studies have investigated how monetary policy serves as a transmission mechanism affecting economic growth within the Sierra Leonean context. However, most of these studies have focused primarily on the impact of monetary policy on economic growth, neglecting its implications for economic development in relation to macroeconomic fundamentals and reforms in Sierra Leone. Methodologically, many studies examining the effects of monetary policy on economic growth in both developed and developing countries have utilized similar approaches.

II. LITERATURE REVIEW

A. Monetary Policy

Monetary Policy encompasses the specific measures implemented by the Central Bank (Monetary Authority) to manage the value, availability, and cost of money within the economy, aiming to fulfill established macroeconomic objectives. The Central Bank of Sierra Leone, similar to its counterparts in both developed and developing nations, strives to attain price stability (characterized by a low inflation rate), full employment, and growth in overall income through the regulation of the money supply. The money supply is categorized into narrow and broad money. According to BSL (2011), narrow money (M1) includes currency in circulation among the non-bank public and demand deposits or current accounts held at banks, while broad money (M2) consists of narrow money (M1) in addition to savings and time deposits, as well as deposits denominated in foreign currency. Audu, Yaaba, and Ibrahim (2018) describe M3 as the total money supply, which includes M2 along with large deposits, institutional money market funds, short-term repurchase agreements, and substantial liquid assets. The liquidity perspective considers money in a more expansive context, incorporating M2 and M3; however, due to the limited liquidity of assets classified under M3, it becomes nearly unfeasible to include any elements of M3. Consequently, the concept of moneyness is viewed as a continuum of the substitutability of various monetary assets for currency and demand deposits.

Economists characterize money as any entity that functions as a medium of exchange within a specific society. Goodfriend (1999) described money as "anything that is generally accepted as a medium of exchange." Friedman (1969) referred to it as "an item that people accept as payment for goods or services." Leeper and Roush (2003) defined money as "anything that passes freely from hand to hand and is generally acceptable in the settlement of debts and other financial obligations." The traditional perspective of the currency school and Keynes defines the money supply as comprising currency and demand deposits, represented by the equation $M = C + D$, where M denotes the money supply, C represents currency, and D signifies demand deposits. Friedman (1968) empirically defined money as the total amount of cash individuals carry and the cash available to them in banks through demand deposits and commercial bank time deposits. His theoretical definition of money encompasses "any asset capable of serving as a temporary abode of purchasing power." Furthermore, Friedman's broader definition includes bank deposits, non-bank deposits, and any other asset types through which monetary authorities can influence future levels of income, prices, employment, or other significant macroeconomic variables, expressed as $M2 = C + D + S + T$. The Radcliffe Committee defined money as "notes plus bank deposits." Huggert (1993) described money as a substantial volume of liquid assets held by financial intermediaries, with the liabilities of non-bank intermediaries serving as close substitutes for money. Intermediaries thus provide an alternative to money as a store of value.

Money proper, defined as the sum of currency and demand deposits, represents only one form of liquid asset. Consequently, a broader definition of money has been established, which encompasses various liquid assets such as bonds, insurance reserves, pension funds, and savings and loan shares. From these definitions, two key observations can be made. Firstly, any entity that functions as money must be widely accepted for the settlement of financial obligations. Secondly, virtually any item can serve as money, provided it is recognized as such within a specific community. The legal tender perspective on defining money highlights the role of law in facilitating the general acceptability of a commodity (Afolabi, 1991). Broad money quantifies the overall money supply within an economy. An excess in money supply, or liquidity, may occur when the total amount of broad money exceeds the level necessary to maintain non-inflationary economic growth. The necessity for regulating the money supply stems from the understanding that a relatively stable correlation exists between the quantity of money and economic activity. If the money supply is not confined to what is essential for supporting productive endeavors, it may lead to adverse consequences such as inflation or deflation (CBN, 2011).

B. The Classical Economist

The origins of monetary policy can be traced back to the contributions of Irving Fisher, a classical economist, as referenced in Diamond (2003). Fisher established the groundwork for the quantity theory of money through his equation of exchange. He posited that money influences only price levels and not economic aggregates. The classical economists' perspective on monetary policy is fundamentally rooted in the quantity theory of money, which is often articulated through the Fisherian equation of exchange, expressed as $MV = PY$. In this equation, M represents the money supply, which the Federal Government can partially control; V signifies the velocity of circulation, indicating the average frequency with which currency is utilized for final goods and services within a year; and P denotes the price level. Consequently, the product PY reflects the current nominal GDP. The equation of exchange serves as an identity, asserting that the total market value of all final goods and services (nominal GDP) must equal the money supply multiplied by the average frequency of currency transactions within a specified year. Classical economists maintain that the economy operates at or near its natural level of real GDP, assuming that in the short term, the Y in the equation remains constant. They further contend that the velocity of money circulation is likely to remain stable, allowing V to be treated as fixed. Therefore, if the Central Bank of Nigeria (CBN) were to implement an expansionary or contractionary monetary policy, the resulting change in money supply (M) would solely affect the price level (P) in direct correlation to the alteration in money supply. In essence, expansionary monetary policy is likely to result in inflation, while contractionary monetary policy is expected to lead to a deflation of the price level.

III. METHODOLOGY

A. Sources of Data

The time-series data for this study were generated from secondary sources which include the Central Bank of Sierra Leone Statistical Bulletin (various issues) and the World Bank Indicators (various issues), particularly from 1993 to 2023.

B. Model Specification

The framework utilized in this research is based on the works of Adigwe, Echekeba, and Onyeagba (2017); Rahman, Sarwar, and Khan (2016); Twinoburyo and Odhiambo (2017); Obeid and Awad (2017); Srithilat and Sun (2017); Ayodeji and Oluwole (2018); and Sulaiman and Migiro (2019). For example, Adigwe et al. (2015) conducted an analysis of the relationship between monetary policy and economic growth in Sierra Leone, critically evaluating factors such as liquidity ratio, broad money supply, and cash reserves in relation to gross domestic product (GDP). Rahman et al. (2016) explored the impact of monetary policy on economic growth, providing empirical evidence from Pakistan. In their research, Twinoburyo and Odhiambo (2017) utilized variables including money supply, interest rates, capital stock, exchange rates, inflation rates, and trade openness to analyze the influence of real gross domestic product on economic growth. Obeid and Awad (2017) examined the effectiveness of monetary policy instruments in fostering economic growth in Jordan, employing a vector error correction model. Their study considered indicators such as the rediscount rate, overnight weighted average interest rates on interbank loans, required reserve ratio, and growth of money supply, while gross domestic product growth was used to measure economic growth. The authors also incorporated variables like the logarithm of money supply, exchange rate, and inflation rate as proxies for monetary policy, with interest rate serving as a proxy for economic growth. Srithilat and Sun (2017) investigated the influence of monetary policy on economic development, utilizing evidence from Lao PDR. They employed real gross domestic product as an indicator of economic growth, while the money supply, real exchange rate, interest rate, and inflation rate served as proxies for monetary policy. Similarly, Ayodeji and Oluwole (2018) analyzed the effects of monetary policy on economic growth in Sierra Leone, using the natural logarithm of gross domestic product as a measure of economic growth, and the natural logarithm of the exchange rate, interest rate, money supply, and capital rate as indicators of monetary policy. In a related study, Sulaiman and Migiro (2019) aimed to explore the relationship between monetary policy and economic growth in Sierra Leone through causality tests, with gross domestic product as the economic growth proxy and exchange rate, money supply, cash reserve ratio, interest rate, and monetary policy rate as the monetary policy variables. The models from these studies have been modified and adapted to align with the specific objectives of the current research. The mathematical and regression form of the model variables in this study are stated as follow:

$$GDPPC_t = f(MPR_t, KS_t, MS_t, INTRSt, CPS_t, REMITR_t, EXR_t, INFR_t) \dots \dots \dots (1)$$

$$\Delta GDPPC_t = \beta_0 + \beta_1 MPR_t + \beta_2 KS_t + \beta_3 MS_t + \beta_4 INTRSt + \beta_5 CPS_t + \beta_5 REMITR_t + \beta_5 EXR_t + \beta_5 INFR_t + \mu_t$$

$$GDPPC_t = \alpha_{ot} + \beta_1 GDPPC_{t-1} + \beta_2 MPR_t + \beta_3 KS_t + \beta_4 MS_t + \beta_5 INTRSt + \beta_6 CPS_t + \beta_7 REMITR_t + \beta_8 EXR_t + \beta_9 INFR_t + \varepsilon_t$$

α_o and β_o are anticipated to address the constant variance present in the aforementioned models. The variable t denotes the time period under consideration, specifically from 1993 to 2023. The term ε represents the stochastic error component serving as a proxy. The mathematical framework outlined above is reformulated into a stochastic model. This stochastic model is designed to encompass the various

estimation techniques employed in this study, which include the ordinary least squares multivariate regression method (OLS), dynamic regression methods such as the Generalized Method of Moments (GMM), the Johansen and Juselius co-integration estimation method, the vector error correction model (VECM), the vector autoregressive model (VAR), and the Engle and Granger causality test.

C. Ordinary Least Square Multivariate Regression Estimation Model

$$\Delta GDPPC_t = \beta_0 + \beta_1 MPR_t + \beta_2 KS_t + \beta_3 MS_t + \beta_4 INTRSt + \beta_5 CPS_t + \beta_5 REMITR_t + \beta_5 EXR_t + \beta_5 INFR_t + \mu_t \dots (2)$$

➤ Dynamic (Generalized Method of Moment) Regression Estimation Model

$$GDPPC_t = \alpha_{ot} + \beta_1 GDPPC_{t-1} + \beta_2 MPR_t + \beta_3 KS_t + \beta_4 MS_t + \beta_5 INTRSt + \beta_6 CPS_t + \beta_7 REMITR_t + \beta_8 EXR_t + \beta_9 INFR_t + \varepsilon_t \dots \dots \dots (3)$$

➤ Johansen and Juselius Co-integration Regression Estimation Model

$$\Delta Y_t = \delta_1 Y_{t-1} + \dots \delta_k \Delta Y_{t-k+1} + \Pi Y_{t-k} \varphi + \varepsilon_t \dots \dots \dots (4)$$

➤ Vector Error Correction Regression Estimation Model

$$\Delta Y_t = c + \sum_{i=1}^{p-1} \eta_i \Delta Y_{t-i} + \phi \gamma_{t-p} + \varepsilon_t \dots \dots \dots (5)$$

Where

ΔY_t is an $n \times 1$ vector of the first difference of all the endogenous variables

C is $n \times 1$ column vector of constants

η_i and ϕ are parameter matrices with orders $n \times n$ and $n \times r$ respectively.

The matrix ϕ can be expressed in terms of the outer product of two matrices of orders $\alpha = n \times k$ and $\beta^1 = k \times r$ implying that $\phi = n \times r$.

Deducing from the equation above, the elements in $\sum_{i=1}^{p-1} \eta_i \Delta Y_{t-i}$ and $\phi \gamma_{t-p}$ captures the short-run and long-run effects respectively.

Specifically ΔY_{t-i} is $n \times k$ first difference vector of endogenous variables.

ε_t is while noise vector of order $n \times 1$

P is the number of lags and t is number of observations taking values from 1 to t .

Equation 4 above is a compressed matrix representation of the system of equations that form the Vector Error Correction

Methodology (VECM) used in the study. The endogenous variables include MPR , KS , MS , $INTRS$, CPS , $REMITR$, EXR and $INFR$. Equation 4 is further expanded as follows:

$$\begin{aligned} \Delta GDPPC_t = & \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-i} + \beta_2 \sum_{i=1}^k \Delta MPR_{t-i} + \beta_3 \sum_{i=1}^k \Delta KS_{t-i} + \beta_4 \sum_{i=1}^k \Delta MS_{t-i} + \beta_5 \sum_{i=1}^k \Delta INTRSt_{i-1} \\ & + \beta_6 \sum_{i=1}^k \Delta CPS_{t-i} + \beta_7 \sum_{i=1}^k \Delta REMITR_{t-i} + \beta_5 \sum_{i=1}^k \Delta EXR_{t-i} + \beta_5 \sum_{i=1}^k \Delta INFR_{t-i} + \mu t \dots \dots \dots (6) \end{aligned}$$

$$\Delta MPR_t = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_3 \sum_{i=1}^k \Delta KS_{t-1} + \beta_4 \sum_{i=1}^k \Delta MS_{t-1} + \beta_5 \sum_{i=1}^k \Delta INTRS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_7 \sum_{i=1}^k \Delta REMTR_{t-1} + \beta_8 \sum_{i=1}^k \Delta EXR_{t-1} + \beta_9 \sum_{i=1}^k \Delta INFR_{t-1} + \mu t \dots \dots \dots (7)$$

$$\Delta KSt = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta KS_{t-1} + \beta_3 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_4 \sum_{i=1}^k \Delta MS_{t-1} + \beta_5 \sum_{i=1}^k \Delta INTRS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_7 \sum_{i=1}^k \Delta REMITR_{t-1} + \beta_8 \sum_{i=1}^k \Delta EXR_{t-1} + \beta_9 \sum_{i=1}^k \Delta INFR_{t-1} + \mu t \dots \dots \dots (8)$$

$$\Delta MS_t = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta MS_{t-1} + \beta_3 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_4 \sum_{i=1}^k \Delta KS_{t-1} + \beta_5 \sum_{i=1}^k \Delta INTRS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_7 \sum_{i=1}^k \Delta REMITR_{t-1} + \beta_8 \sum_{i=1}^k \Delta EXR_{t-1} + \beta_9 \sum_{i=1}^k \Delta INFR_{t-1} + \mu t \dots \dots \dots (9)$$

$$\Delta INTRSt = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta INTRS_{t-1} + \beta_3 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_4 \sum_{i=1}^k \Delta KS_{t-1} + \beta_5 \sum_{i=1}^k \Delta MS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_7 \sum_{i=1}^k \Delta REMITR_{t-1} + \beta_8 \sum_{i=1}^k \Delta EXR_{t-1} + \beta_9 \sum_{i=1}^k \Delta INFR_{t-1} + \mu t \dots \dots \dots (10)$$

$$\Delta CPSt = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_3 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_4 \sum_{i=1}^k \Delta KS_{t-1} + \beta_5 \sum_{i=1}^k \Delta MS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta INTRS_{t-1} + \beta_7 \sum_{i=1}^k \Delta REMITR_{t-1} + \beta_8 \sum_{i=1}^k \Delta EXR_{t-1} + \beta_9 \sum_{i=1}^k \Delta INFR_{t-1} + \mu t \dots \dots \dots (11)$$

$$\Delta REMITR_t = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta REMITR_{t-1} + \beta_3 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_4 \sum_{i=1}^k \Delta KS_{t-1} + \beta_5 \sum_{i=1}^k \Delta MS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta INTRS_{t-1} + \beta_7 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_8 \sum_{i=1}^k \Delta EXR_{t-1} + \beta_9 \sum_{i=1}^k \Delta INFR_{t-1} + \mu t \dots \dots \dots (12)$$

$$\Delta EXR_t = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta EXR_{t-1} + \beta_3 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_4 \sum_{i=1}^k \Delta KS_{t-1} + \beta_5 \sum_{i=1}^k \Delta MS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta INTRS_{t-1} + \beta_7 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_8 \sum_{i=1}^k \Delta REMITR_{t-1} + \beta_9 \sum_{i=1}^k \Delta INFR_{t-1} + \mu t \dots \dots \dots (13)$$

$$\Delta INFR_t = \beta_0 + \beta_1 \sum_{i=1}^k \Delta GDPPC_{t-1} + \beta_2 \sum_{i=1}^k \Delta INFR_{t-1} + \beta_3 \sum_{i=1}^k \Delta MPR_{t-1} + \beta_4 \sum_{i=1}^k \Delta KS_{t-1} + \beta_5 \sum_{i=1}^k \Delta MS_{t-1} \\ + \beta_6 \sum_{i=1}^k \Delta INTRS_{t-1} + \beta_7 \sum_{i=1}^k \Delta CPS_{t-1} + \beta_8 \sum_{i=1}^k \Delta REMITR_{t-1} + \beta_9 \sum_{i=1}^k \Delta EXR_{t-1} + \mu t \dots \dots \dots (14)$$

D. Engle and Granger Causality Estimation Model

$$GDPPCI_t = \sum_{i=1}^n \beta_i MPR_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (16)$$

$$MPR_t = \sum_{i=1}^n \gamma_i MPR_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (17)$$

$$GDPPCI_t = \sum_{i=1}^n \beta_i KS_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (18)$$

$$KS_t = \sum_{i=1}^n \gamma_i KS_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (19)$$

$$GDPPCI_t = \sum_{i=1}^n \beta_i MS_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (20)$$

$$MS_t = \sum_{i=1}^n \gamma_i MS_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (21)$$

$$GDPPCI_t = \sum_{i=1}^n \beta_i INTR_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (22)$$

$$INTR_t = \sum_{i=1}^n \gamma_i INTR_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (23)$$

$$GDPPCI_t = \sum_{i=1}^n \beta_i CPS_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (24)$$

$$CPS_t = \sum_{i=1}^n \gamma_i CPS_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (25)$$

$$GDPPCI_t = \sum_{i=1}^n \beta_i REMITR_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (26)$$

$$REMITR_t = \sum_{i=1}^n \gamma_i REMITR_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (27)$$

$$GDPPCI_t = \sum_{i=1}^n \beta_i EXR_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (28)$$

$$EXR_t = \sum_{i=1}^n \gamma_i EXR_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (29)$$

$$GDPPCI_t = \sum_{i=1}^n \beta_i INFR_{t-1} + \sum_{j=1}^n \alpha_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (22)$$

$$INFR_t = \sum_{i=1}^n \gamma_i INFR_{t-1} + \sum_{j=1}^n \delta_j GDPPCI_{t-1} + \mu_t \dots \dots \dots (23)$$

E. A-Priori Expectation

A priori expectation is frequently referenced in reasoning to differentiate necessary conclusions derived from initial premises (Wikipedia, 2018). Within the realms of econometrics and statistics, a priori expectation can be viewed as a form of justification for a variable, theory, or provisional statement in relation to empirical findings. It represents a mental outcome that a researcher anticipates achieving at the conclusion of their study, potentially based on identified gaps, theories, and propositions. When the eventual results contradict the a priori expectations, the researcher typically provides compelling explanations for this discrepancy, which may align with the findings of previous researchers or existing theories, among other factors. In this context, the a priori expectations for the coefficients of the variables are as follows: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$, $\beta_5 > 0$, $\beta_6 > 0$, $\beta_7 > 0$, and $\beta_8 < 0$ across the respective stochastic models. β_1 denotes the coefficient of the monetary policy rate, which is anticipated to have a negative correlation with economic development. β_2 represents the coefficient of capital stock, expected to maintain a positive relationship with economic development. β_3 is the coefficient of the money supply, which is projected to have a positive connection with gross domestic product per capita income. β_4

indicates the coefficient of interest rate spread, which is expected to positively correlate with economic development. β_5 is the coefficient of investment, anticipated to positively influence economic development. β_6 and β_7 are the coefficients for remittances received and the nominal exchange rate, both expected to have a positive impact on economic development. Finally, β_8 signifies the coefficient of the inflation rate, which is expected to negatively affect economic development. Furthermore, the sequence of a priori expectations regarding the variables in this study aligns with the arguments presented in the standard Mundell-Fleming-Dornbusch Model. This model clearly posits that under effective and expansionary monetary policy, interest rates decline, leading to a depreciation of the real exchange rate. This, in turn, fosters capital accumulation, stimulates investment, increases the money supply, reduces inflation, and both directly and indirectly encourages remittances within the domestic economy. Ultimately, these effects contribute to an increase in real output, specifically in terms of gross domestic product and per capita income (Rafiq & Mallick, 2008).

IV. DATA PRESENTATION AND ANALYSIS

A. Data Analysis

Here the data used are analyzed using the stated estimation methods.

B. Unit Root Test

Table 1: Augmented Dickey-Fuller Unit Root Test

Variables	T- statistic	T-critical values	Remark
GDPPCG	-4.704122	-2.912631	Stationary at level
MPR	-0.892650	-2.912631	Not stationary at level
MPR	-8.850461	-.2.913549	Stationary at first difference
KS	--2.926329	-2.934517	Not stationary at level
KS	-13.28851	-2.595033	Stationary at first difference
MS	-4.922987	-2.912631	Stationary at level
INTRS	-1.632831	-2.912631	Not stationary at level
INTRS	-7.918955	-2.913549	Stationary at first difference
CPS	-2.216515	-2.912631	Not stationary at level
CPS	-6.562776	-2.913549	Stationary at first difference
REMITR	-2.288744	-2.912631	Not stationary at level
REMITR	-3.146863	-2.918778	Stationary at first difference
EXR	-6.711427	-2.912631	Stationary at level
INFR	-1.723288	-2.923780	Not stationary at level
INFR	-5.971552	-2.923780	Stationary at first difference

Source: Researcher's Computation from E-View 13.0 (2024)

Table 2: Phillips-Perron Unit Root Test

Variables	T- statistic	T-critical values	Remark
GDPPCG	-4.67085	-2.912631	Stationary at level
MPR	-0.782556	-2.912631	Not stationary at level
MPR	-8.839901	-.2.913549.	Stationary at first difference
KS	--7.219867	-2.912631	Stationary at level
MS	-4.783291	-2.912631	Stationary at level
INTRS	-1.411762	-2.912631	Not stationary at level
INTRS	-12.61309	-2.913549	Stationary at first difference
CPS	-1.879381	-2.912631	Not stationary at level
CPS	-8.808968	-2.913549	Stationary at first difference
REMITR	-2.470073	-2.912631	Not stationary at level
REMITR	-9.272975	-2.913549	Stationary at first difference
EXR	-5.511098	-2.912631	Stationary at level
INFR	-3.397757	-2.914517	Stationary at level

Source: Researcher's Computation from E-view 13.0 (2024)

The tables presented above illustrate the results of unit root tests conducted using the Augmented Dickey-Fuller and Phillips-Perron methods at a significance level of 5%, based on the time series data. A comparison of the Augmented Dickey-Fuller t-statistic with the critical t-values at the 5% level indicates that the growth of gross domestic product per capita (GDPPCG), money supply (MS), and real exchange rate are stationary at their levels. In contrast, the monetary policy rate (MPR), capital stock (KS), interest rate spread (INTRS), credit to the private sector (CPS), and inflation rate (INFR) exhibit stationarity only at the first difference. According to the Phillips-Perron unit root test, the cost of capital, which was found to be stationary at the first difference in the Augmented Dickey-Fuller test, does not possess a unit root at the level. Similarly, GDPPCG, MS, and the real exchange rate are stationary at their levels. However,

MPR, KS, INTRS, CPS, and INFR are stationary at the first difference when assessed using the Phillips-Perron test. The stationarity of these variables across both unit root testing methods suggests the elimination of potential spurious relationships. The fact that the time series are stationary at both levels and first differences further supports the selection of the econometric estimation techniques outlined in the methodology section of this study.

- **Diagnostic Tests** This subsection addresses the various regression assumption tests designed to ensure that the best linear unbiased estimation is achieved, thereby confirming the robustness of the research findings in relation to model specification. The table below presents the results of the individual regression assumption tests.

Table 3: Diagnostic Tests Result

Variance inflation factors (VIFs)		
VARIABLES	Uncentered VIF	Centered VIF
C	13.0440	0.000
MPR	16.3656	4.9699
KS	1.0674	1.0660
MS	3.1172	1.3645
INTRS	15.2712	5.0045
CPS	17.8638	3.1040
REMITR	17.8404	8.9591
EXR	11.1075	7.6007
INFR	3.4035	1.6491
Breusch – Godfrey – serial correlation LM test		
F-statistic = 6.2518	Prob. F(2, 47)	0.003
Obs * R-squared = 15.06	Prob. Chi-square (2)	0.002
Heteroskedasticity test: Breusch-Pagan Godfrey		
F-statistic 2.5000	Prob. F(8, 49)	0.023
Obs * R-squared 16.8123	Prob. Chi-square (4)	0.032
Ramsey REET Test		
F-statistic 0.4013	df.(4,45)	0.001

Source: Author's Computation from E-Views 13.0 version (2024).

The diagnostic table presented above indicates that the variance inflation factor (VIF) for each variable is below 10 (centered VIF < 10). This finding suggests that there is no multicollinearity present among the explanatory variables. The results of the ARCH (Breusch-Pagan Godfrey) test for heteroskedasticity reveal the existence of homoscedasticity, as evidenced by a probability value of less than 0.05, thereby supporting the assumption of constant variance in the ordinary least squares estimator. Additionally, the outcome of the Breusch-Godfrey serial correlation LM test shows a

probability value of less than 0.05, which indicates the absence of higher-order correlation. Finally, the Ramsey Reset Test also yields a probability value below 0.05, further reinforcing the validity of the regression model.

C. Descriptive Analyses

Essentially in this section, interpretation of the summary statistics is presented beginning with the descriptive statistics in the table below:

Table 4: Descriptive Statistics

	GDPPCG	MPR	KS	MS	INTRS	CPS	REMITR	EXR	INFR
Mean	1.0094	12.1653	0.3920	22.8035	4.6956	8.5454	0.8954	52.2651	15.9840
Maximum	22.4489	31.6500	40.3885	89.1978	11.6641	22.2892	3.2438	360.0800	72.8300
Minimum	17.5533	0.0000	30.1716	12.6587	0.0000	3.6966	0.0000	0.5467	3.7263
Std. Dev.	6.8366	8.1041	10.6885	20.2960	3.3070	3.8835	0.9072	85.0432	15.6324
Skewness	0.2110	0.0229	0.1782	1.2891	0.0431	1.5960	0.9662	1.5917	1.9214
Kurtosis	5.5016	2.1202	6.6798	4.9814	1.9409	5.5707	2.7572	5.1439	6.3224
Jarque-Bera	15.5541	1.8754	33.0320	25.5519	2.7282	40.5961	9.1686	75.6000	62.3659
Probability	0.0004	0.0015	0.0000	0.0000	0.0056	0.0000	0.0102	0.0000	0.0000
Observations	58	58	58	58	58	58	58	58	58

Source: Researcher's Computation from E-Views 13.0 Version (2024).

The data presented in the table indicates that the growth of gross domestic product per capita income reached a maximum mean of 22.44% during the specified period, accompanied by a standard deviation of 6.83%. This low standard deviation suggests minimal variability in the growth of gross domestic product per capita income over the extended timeframe. The skewness of the distribution is recorded at 0.2110, indicating a slight asymmetry around the mean. Furthermore, the kurtosis value of 5.5016 signifies a peaked distribution, classified as leptokurtic. The Jarque-Bera statistic of 15.554, with a P-value of 0.000, is statistically significant at the 5% level, confirming that the data follows a normal distribution. In terms of the monetary policy rate (MPR), the maximum average value observed is

31.10%, with a notable standard deviation of 8.104%. The skewness is slightly positive at 0.022, suggesting a lack of symmetry around the mean of the monetary policy rate. The kurtosis value of 2.120 indicates a flat distribution, categorized as platykurtic. The Jarque-Bera statistic of 1.8754, with a probability value of 0.000, is statistically significant at the 5% level, further supporting the conclusion of normal distribution for this variable. Regarding capital stock, the maximum average value during the period is 40.38%, with a considerable standard deviation of 10.68. The skewness is measured at 0.178, while the kurtosis is identified as leptokurtic. The Jarque-Bera statistic of 33.0320, with a probability of 0.000, is statistically significant at the 1% level,

indicating that this variable is also normally distributed throughout the examined period.

Lastly, the money supply (MS) exhibits a maximum average value of 89.19%, accompanied by a very high standard deviation of 20.296%. This significant standard deviation reflects the considerable risk associated with the elevated money supply in the economy during the period, which is often linked to rampant inflation, the ongoing devaluation of the exchange rate, while enhancing the attractiveness of investment opportunities, may lead to diminished returns for investors at both macroeconomic and microeconomic levels within the economy. The skewness of the money supply variable is recorded at 1.289, indicating a slight positive skewness and a near-symmetrical distribution around the mean. The kurtosis value of 4.985, which is close to 5, suggests a leptokurtic distribution, indicating that the data is concentrated around the mean during the specified period. The Jargue-Bera statistic of 25.551, with a corresponding probability value of 0.000 ($P=0.000$), is statistically significant at the 1% level, confirming that the variable follows a normal distribution throughout the observed timeframe.

In terms of the interest rate spread, which reflects the difference between deposit and lending rates, the maximum mean value reached 11.66%, with a standard deviation of 3.69 indicating variability from the mean. The skewness for this variable is 0.043, while the kurtosis is measured at 1.940, categorizing it as platykurtic. The Jargue-Bera statistic of 2.728, with a probability value of 0.005 ($P=0.005$), is statistically significant at the 5% level, suggesting that this variable also adheres to a normal distribution during the period analyzed. Regarding credit to the private sector, the maximum average value is noted at 22.28%, with a standard deviation of 3.883 reflecting variability from the mean. The risk associated with this variable indicates a propensity for credit to the private sector in Sierra Leone to influence money supply and contribute to a consistent inflationary trend. The skewness is positive at 1.596, showing slight symmetry around the mean value of the credit variable. The kurtosis value of 5.570 is leptokurtic, indicating a peaked distribution around the mean during the examined period. The Jargue-

Bera statistic of 40.596, with a probability value of 0.000 ($P=0.000$), is statistically significant at the 1% level, further confirming the normal distribution of this variable in the observed timeframe.

The highest mean value of remittances received (REMITR) during the specified period is 3.24%, with a standard deviation of 0.907 indicating the dispersion from the mean. The skewness of this variable is recorded at 0.966, while the kurtosis value of 2.757 suggests a platykurtic distribution. The Jargue-Bera statistic is 9.168, with a probability value of 0.010, which is statistically significant at the 5% level, indicating that the variable follows a normal distribution during the analyzed period. The real exchange rate (EXR) exhibits a maximum average value of N360.080, with a variability of 85.043 from the mean in the period under review. The inherent risk associated with this variable indicates a potential devaluation of the naira against the dollar, which adversely impacts the Sierra Leone economy, often leading to an increase in the price levels of goods and services. The skewness is positive at 1.591, suggesting a slight symmetry around the mean. The kurtosis value of 5.143 is classified as leptokurtic, indicating a peaked distribution around the mean during the period. The Jargue-Bera statistic stands at 35.600, with a probability value of 0.000, which is statistically significant at the 1% level, confirming that the variable is normally distributed in the observed timeframe. The inflation rate, represented by the consumer price index, has a maximum average value of 72.835% and a standard deviation of 15.632. This exceedingly high inflation rate has posed a fiscal policy challenge that successive governments in Sierra Leone have sought to address alongside monetary policy measures. The skewness is recorded at 1.921, with a kurtosis of 6.322, while the Jargue-Bera statistic is 62.365, which is statistically significant at the 1% level, indicating that the variable is normally distributed.

D. Pearson Correlation Statistics

In econometric analysis, it is crucial to ensure that the independent variables in the model specification do not exhibit excessive correlation with one another. Additionally, it is important to preliminarily assess the relationships among the variables within a study.

Table 5: Pearson Correlation Matrix

VARIABLES	GDPPCG	MPR	KS	MS	INTRS	CPS	REMITR	EXR	INFR
GDPPCG	1								
MPR	-0.016	1							
KS	0.192	0.084	1						
MS	0.295	0.199	-0.016	1					
INTRS	0.172	0.834	0.114	0.166	1				
CPS	-0.043	0.335	-0.000	-0.225	0.531	1			
REMITR	0.015	0.553	0.135	0.002	0.672	0.753	1		
EXR	0.068	0.497	0.108	-0.115	0.628	0.724	0.918	1	
INFR	-0.124	0.441	0.033	0.255	0.193	-0.080	-0.000	-0.110	1

Source: Researcher's Computation from E-Views 13.0 Version (2024)

The table presented above illustrates the Pearson correlation matrix concerning the transmission mechanisms of monetary policy and economic development in Sierra Leone for the period from 1960 to 2018. The monetary policy rate (MPR) exhibits a negative correlation with GDP per capita growth (GDPPCG) at $r = -0.016$, indicating that the monetary policy rate has not served as an effective instrument for fostering economic development in Sierra Leone, thereby affecting the well-being of its citizens during the specified timeframe. Conversely, capital stock (KS) shows a strong positive correlation with GDPPCG ($r = 0.192$), suggesting that fixed capital accumulation significantly contributes to economic development and growth in Sierra Leone. Additionally, the relationship between money supply (MS) and GDPPCG is robust and favorable ($r = 0.295$), indicating that money supply has been a significant driver of economic development and growth in the country during the reference period. The interest rate spread (INTRS) also demonstrates a positive association with GDPPCG ($r = 0.172$), implying that the difference between deposit and lending rates set by the Bank of Sierra Leone (BSL) has the potential to stimulate economic activities positively, assuming other economic factors remain constant. In contrast, credit to the private sector (CPS) shows a weak negative correlation with GDPPCG ($r = -0.043$), suggesting that over time, credit extended to the private sector in Sierra Leone has not effectively stimulated economic activities or development. Furthermore, the remittances received by Sierra Leone from migrants exhibit a weak positive correlation with GDPPCG ($r = 0.015$) during the examined period, indicating that these remittances have not significantly driven economic activities or contributed to the growth and development of the Sierra Leone economy. Lastly, the real exchange rate and GDPPCG are weakly and positively correlated ($r = 0.068$) throughout the period under review.

E. Engle and Granger Causality Test

Table 6: Pairwise Granger Causality Result

Null hypothesis	Obs	F-statistics	Prob.
MPR does not Granger cause GDPPCG	58	0.136	0.003
KS does not Granger cause GDPPCG	58	3.357	0.053
GDPPCG does not Granger cause MS	58	1.188	0.000
MPR does not Granger cause INTRS	58	7.178	0.001
MS does not Granger cause KS	58	3.509	0.016
INTRS does not Granger cause KS	58	2.992	0.029
INTRS does not Granger cause CPS	58	5.037	0.028
REMITR does not Granger cause INTRS	58	5.403	0.023
EXR does not Granger cause INTRS	58	4.443	0.039
REMITR does not Granger cause CPS	58	5.246	0.025
EXR does not Granger cause CPS	58	4.582	0.036
EXR does not Granger cause REMITR	58	5.434	0.023
REMITR does not Granger cause EXR	58	4.877	0.031
EXR does not Granger cause INFR	58	3.126	0.002

Source: Researcher's Computation from E-view 13.0 (2024)

Table F presented above illustrates the Granger causality relationships among the variables within the study's framework. The findings indicate that the monetary policy rate (MPR) exhibits a one-way Granger causality with the

The theoretical framework posits that the real exchange rate significantly impacts economic activities, particularly in light of the ongoing appreciation of the domestic currency relative to foreign currencies. During the reference period, the relationship between the inflation rate and the growth of gross domestic product per capita income is weak and negative ($r = -0.124$). This inverse correlation may be attributed to the rising inflation rate observed in Sierra Leone, as indicated by the descriptive statistics presented earlier. In terms of the relationships among monetary policy variables, the correlation between KS and MPR is weak and positive ($r = 0.084$), while MS and MPR exhibit a strong and favorable relationship ($r = 0.199$). Additionally, INTRS and MPR show a strong positive association ($r = 0.134$), as do CPS and MPR ($r = 0.335$), REMITR and MPR ($r = 0.253$), and EXR and MPR, which have a very strong positive correlation ($r = 0.497$). Furthermore, INFR and MPR also demonstrate a strong positive relationship ($r = 0.441$) during the reference period. Conversely, the relationship between MS and KS is weak and negative ($r = -0.016$), while INTRS and KS are positively correlated ($r = 0.114$). There is no association between CPS and KS ($r = 0.000$), although KS does show a positive correlation with remittances received ($r = 0.135$), the exchange rate ($r = 0.108$), and the inflation rate ($r = 0.033$) during the examined period. MS is positively associated with INTRS ($r = 0.168$), REMITR ($r = 0.002$), and INFR ($r = 0.255$), but it is negatively correlated with CPS ($r = -0.225$) and EXR ($r = -0.115$). INTRS is positively related to other monetary policy indicators, including CPS ($r = 0.531$), REMITR ($r = 0.672$), EXR ($r = 0.628$), and INFR ($r = 0.193$) throughout the study period. CPS shows a favorable association with REMITR ($r = 0.753$) and EXR ($r = 0.724$), while it is negatively related to INFR ($r = 0.080$). Although REMITR is positively related ($r = 0.318$), it has no correlation with INFR ($r = 0.000$).

growth of gross domestic product per capita income, achieving statistical significance at the 5% level. This suggests that the MPR is a crucial determinant of GDP per capita growth in Sierra Leone during the analyzed period.

Additionally, a one-way causal relationship is noted between capital stock and GDP per capita income growth, which is also statistically significant. This highlights the importance of fixed capital accumulation as a significant monetary policy variable influencing economic development in Sierra Leone. Furthermore, GDP per capita income growth demonstrated a one-way causal link with the money supply in Sierra Leone during the specified timeframe, which was statistically significant. The relationship between MPR and interest rates (INTRS) is characterized as uni-directional and statistically significant. The analysis of money supply and capital stock reveals a one-way causal relationship that is statistically significant at the 5% level. Moreover, interest rate spread was found to Granger cause capital stock, with statistical significance, indicating that a favorable interest rate spread encourages capital accumulation, thereby enhancing the Sierra Leone economy. Interest rate spread also Granger causes credit supply to the private sector, which is statistically significant. In the realm of economics, the extension of credit by banks invariably involves interest charges. When banks have sufficient deposits, this may lead to a reduction in interest rates for borrowers, facilitating easier access to funds for investment purposes. This favorable situation promotes improved living standards, increases in per capita income, and overall economic development.

Migrant remittances have been found to exhibit a one-way Granger causality relationship with the interest rate spread, demonstrating statistical significance during the reference period. This observation highlights a noteworthy

aspect of monetary policy transmission mechanisms, particularly concerning the interplay between remittances and interest rate spreads. Migrants who contribute higher remittance inflows to a domestic economy tend to influence the deposit rates offered by banks. Consequently, when migrants opt to borrow from these banks, they may benefit from lower loan rates. This scenario is likely to stimulate investment activities, thereby enhancing per capita income and fostering economic development. Additionally, the exchange rate has been identified as a Granger cause of the interest rate spread, with statistical significance. This suggests that an appreciation of the exchange rate in foreign borrowings can lead to a more favorable interest rate spread within the economy. Furthermore, remittances have been shown to Granger cause credit to the private sector in a unidirectional manner. Deposits made by migrants in local banks can be utilized to extend credit to private sector customers. The private sector plays a crucial role in driving economic activities, reducing unemployment, and ultimately promoting economic development. The exchange rate also demonstrates a one-way causal relationship with private sector credit, which is statistically significant. Notably, both the exchange rate and remittance inflows exhibit two causal relationships that are statistically significant. The exchange rate serves as a conduit for remittances entering a home country from abroad. A favorable exchange rate enhances the flow of remittances, which in turn encourages investment activities and capital expenditures, ultimately leading to economic growth and development.

F. Long-Run Impact Analysis of Monetary Policy Transmission Mechanisms on Economic Development in Sierra Leone

Table 7: Ordinary Least Square Multivariate Regression Result

Dependent variable: GDPPCG

Dependent variable: GDI:FCG			
Variables	Coefficient values	T- values	Prob. Values
C	-1.810	-0.600	0.551
MPR	0.005	0.024	0.980*
KS	0.145	1.782	0.032**
MS	0.206	4.752	0.000**
INTRS	-0.690	-1.247	0.219*
CPS	0.255	0.617	0.540*
REMITR	6.495	-2.160	0.036**
EXR	0.099	2.847	0.005**
INFR	-0.016	-0.219	0.827*
AR(4)	-0.452	-3.206	0.002
R-squared = 0.632			
Adjusted R-square = 0.605			
F-statistic = 3.391 (P-Value= 0.000)			
Durbin – Watson statistic = 1.544			

Source: Researcher's Computation from E-view 13.0 version (2024)

Where * indicates not statistically significant and ** represents statistically significant.

Table G presented above indicates that the coefficient of determination (R-squared) is approximately 63%, which implies that 37% remains unexplained due to the stochastic error term. The adjusted R-squared is around 60%, suggesting that 40% is also unexplained as a result of the error term. This reflects the model's goodness of fit and suggests that the independent variables serve as significant predictors of

economic development in Sierra Leone during the specified period. The F-statistic of 3.391 ($P = 0.003$) confirms the existence of a linear relationship between the growth of gross domestic product per capita and the independent variables in the model over the long term. It can be inferred that these explanatory variables collectively exert a statistically significant long-term influence on economic development in

Sierra Leone. The individual coefficient for the monetary policy rate, at 0.5%, shows a positive effect on economic development in Sierra Leone, although it is not statistically significant. In contrast, the capital stock, representing gross fixed capital formation, has a coefficient of 14.5%, indicating a positive and statistically significant long-term impact on economic development in Sierra Leone at the 5% level. The money supply, with a coefficient of 20.6%, also positively influences economic growth in Sierra Leone and is statistically significant at the 1% level. Conversely, the

interest rate spread coefficient is negative (-69.0%) and does not achieve statistical significance at the 5% level, suggesting that the interest rate spread acts as a detrimental monetary policy channel for economic development, lacking a favorable long-term impact in Sierra Leone. Additionally, while credit to the private sector demonstrates a positive long-term effect on economic development, it is not a statistically significant monetary policy indicator within the context of Sierra Leone.

G. Dynamic Model Regression Analysis

Table 8: Presentation of Generalized Method of Moment (GMM) Regression Result

Dependent variable: GDPPCG

Variables	GMM Regression Coefficients	T-values	Prob- Values
C	-2.813	-1.226	0.227
MPR	0.101	0.707	0.483
KS	0.133	2.563	0.014
MS	0.170	4.221	0.000
INTRS	-710	-2.191	0.034
CPS	0.300	0.878	0.384
REMITR	-5.044	-2.081	0.043
EXR	0.079	3.079	0.003
INFR	-0.033	-0.934	0.355
AR(4)	-0.377	-3.867	0.000
	(1)		
R-squared	0.699		
Adjusted R-squared	0.664		
J-statistics	8.120		
Prob (J-statistic)	0.002		
Durbin-watson stat	1.595		

Source: Researcher's Computation from E-View 13.0 Version (2024)

The table presented above illustrates the results of the dynamic regression analysis following the achievement of convergence. It indicates an R^2 value of 0.699, which implies that the model accounts for 69.9% of the systematic variations in the dependent variable, GDPPCG, with an adjusted R^2 of 0.664 (66.4%). The J-statistic is recorded at 8.120, accompanied by a p-value of 0.002, signifying statistical significance during the reference period. Additionally, the Durbin-Watson statistic stands at 1.595, suggesting that there is no serial correlation present in the model. These findings indicate that the monetary policy transmission mechanisms analyzed in this study are crucial factors influencing economic development in Sierra Leone, thereby providing valuable insights for policy formulation. Regarding the impact of each monetary policy transmission mechanism on Sierra Leone economic development, it is noted that the monetary policy rate shows a positive coefficient of 10.1%, although it carries an insignificant p-value of 0.483 for the period under review. This suggests that while monetary policy does play a role in the development of the Sierra Leone economy, its effect is not statistically significant. This lack of significance may be attributed to the varying monetary policy approaches adopted by successive governments in Sierra Leone over time. Conversely, the money supply (MS) demonstrates a statistically significant positive effect of 17.0% on gross domestic product per capita,

reinforcing previous research and theoretical perspectives that assert the role of money supply in fostering economic growth and development. Furthermore, capital stock has a positive and statistically significant impact of 13.3% on the growth of gross domestic product per capita during the examined period, indicating that capital accumulation is instrumental in enhancing economic activities, investments, and the overall growth and development of Sierra Leone economic landscape.

The interest rate spread has been found to have a detrimental impact (-71%) on economic development, with statistical significance at the 5% level. This indicates that the interest rate, which reflects the difference between deposit and lending rates, is not regarded as a crucial monetary policy instrument capable of influencing economic activities, per capita income, and overall economic performance in Sierra Leone, given its notable significance. Conversely, credit extended to the private sector has shown a positive effect (30%) on gross domestic product per capita, a measure of economic development in Sierra Leone; however, this effect is not statistically significant. The positive yet insignificant nature of this variable may suggest that the credit facilities provided by banks to the private sector for investment purposes are inadequate. Additionally, remittance inflows from migrants abroad have demonstrated a negative effect (-

5.04%) that is significant for economic development in Sierra Leone. Despite the recent increase in remittance inflows, these funds may primarily be utilized for consumption rather than for capital investments, which are essential for positively impacting economic activities and fostering economic development. The exchange rate has been observed to have a positive contribution (7.9%) that is statistically significant to economic development in Sierra Leone. This favorable outcome may be attributed to effective exchange rate management policies that have surpassed the challenges

posed by poor exchange rate management in various governmental regimes. Lastly, the inflation rate, which can be seen as a double-edged sword, has exerted a negative effect (-37.7%) that is statistically insignificant over time on Sierra Leone economic development. This negative impact may stem from factors such as increased money supply, high remittance inflows, exchange rate devaluation, and capital accumulation, which could lead to excessive spending within the economy.

H. Johansen Co-Integration Test Results

Table 9: Co-integration Analysis – Unrestricted Cointegration Rank Test (Trace and Max-Eigen Values)

Hypothesis	Test statistics	Critical value at 5%	Maximum Eigenvalue	Critical values at 5%
$R = 0$	312.388	197.370	97.882	58.433
$R \leq 1$	214.505	159.529	78.683	52.362
$R \leq 2$	135.822	125.615	57.273	46.231

Source: Researcher's Computation from E-Views 13.0, (2024)

The Johansen co-integration analysis presented above reveals the presence of at least three co-integration equations, as indicated by the trace statistics and the maximum Eigenvalue statistic, both of which were statistically significant at the 5% (0.05) level. This finding implies a long-term relationship between the mechanisms of monetary policy transmission and economic development in Sierra Leone. Consequently, a significant long-run relationship is established among these variables.

V. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

A. Summary of Findings

The monetary policy transmission mechanism was determined to exhibit both short-term and long-term relationships with economic development during the specified period. Similarly, the monetary policy transmission mechanisms analyzed in this study were identified as having a sustained long-term effect on economic development in Sierra Leone.

- The monetary policy rate was found to have a long-term effect on economic development in Sierra Leone, although it was not statistically significant.
- The money supply demonstrated a significant positive long-term relationship with economic development in Sierra Leone during the observed period.
- Capital stock exhibited strong and positive relationships with economic development in both the short and long term in Sierra Leone.
- The interest rate spread, defined as the difference between deposit and lending rates, showed a robust and positive correlation with economic development and was statistically significant.
- Credit extended to the private sector had a positive but statistically non-significant long-term impact on economic development in Sierra Leone.

- Inflows of migrant remittances were found to have a weak but positive short-term relationship with economic development during the reference period.
- The exchange rate was determined to have a significant positive influence on economic development in Sierra Leone during the period under review.
- The inflation rate was found to have a significant negative relationship with economic development in Sierra Leone during the examined period.

B. Conclusion

The relationship between monetary policy transmission mechanisms and a nation's economic development is of paramount importance. This research has thoroughly examined the role of these mechanisms in fostering economic growth within the context of Sierra Leone. A review of existing literature indicates that previous studies have predominantly focused on the ways in which monetary policy facilitates economic growth. Furthermore, there is a notable scarcity of research that utilizes monetary policy indicators such as remittances, interest rate spreads, gross fixed capital formation, and private sector credit to analyze their effects on economic development in Sierra Leone. While some earlier studies have relied on proxies like GDP, real GDP, and GDP growth to measure economic growth, this study distinguishes itself by evaluating the impact of monetary policy transmission mechanisms on economic development through the lens of gross domestic product per capita income growth. This particular measure was selected as it provides insight into the living standards of the population and the overall economic well-being. The findings suggest that monetary policy transmission mechanisms serve as significant short-term and long-term catalysts for economic activity, growth, and development in Sierra Leone.

C. Recommendations

The findings from the aforementioned study clearly indicate that the economic development of Sierra Leone is significantly influenced by the effectiveness of monetary policy transmission mechanisms, assuming all other factors

remain constant. Consequently, this study presents the following recommendations:

- The Ministry of Finance and the Bank of Sierra Leone, as the monetary authority, should consistently ensure a well-coordinated and optimal combination of monetary policy instruments to effectively impact economic activities, stimulate investments, and thereby contribute to macroeconomic stability in Sierra Leone.
- The Bank of Sierra Leone (BSL) should regularly reassess the monetary policy rate to ensure it remains conducive to fostering a favorable investment and business environment in Sierra Leone.
- The monetary authority must implement effective policies aimed at encouraging remittance inflows into Sierra Leone, directing these funds towards investments rather than consumption, which may lead to inflationary pressures.
- The BSL should consider increasing the money supply to promote capital accumulation and support both short-term and long-term economic growth and development in Sierra Leone.
- The study's results indicate that credit to the private sector in Sierra Leone is currently insufficient and does not positively contribute to economic development. Therefore, it is recommended that the BSL establish a mechanism to monitor and evaluate the volume of credit extended to the private sector, along with interest rates and their impacts, through an appropriate framework in Sierra Leone.
- The exchange rate plays a crucial role in the economy. The federal government, through the monetary authority, should develop an effective exchange rate management policy aimed at promoting stability and facilitating the appreciation of the naira against the dollar, thereby positively influencing economic activities in Sierra Leone.
- The interest rate spread has been determined to Granger-cause capital stock and credit to the private sector, demonstrating significance. It is imperative for monetary authorities to recognize this reality and to maintain an effective interest rate spread to foster investment opportunities. The adverse relationship between the inflation rate and the growth of gross domestic product per capita can be attributed to the rising inflation rate in Sierra Leone.
- Furthermore, the inflation rate has been shown to have a negative and insignificant long-term effect on economic development in Sierra Leone. Therefore, monetary authorities should adopt more comprehensive measures to assess the inflation phenomenon beyond merely relying on the consumer price index.

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